



DEPARTMENT OF DEFENSE
STRATEGIC DEFENSE INITIATIVE ORGANIZATION
WASHINGTON, DC 20301-7100

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JUN 17 1987

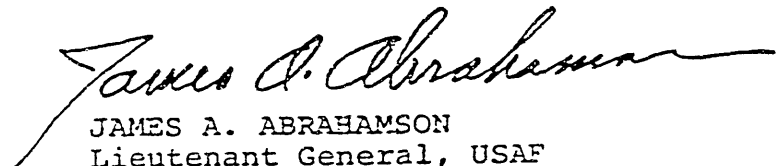
17 June 1987

MEMORANDUM FOR THE SECRETARY OF DEFENSE

SUBJECT: Congressional Brochure on the Advanced Launch System
(ALS)

Attached is a brochure that has been coordinated with the Air Force and NASA to emphasize the need to develop a new national Advanced Launch System (ALS). This brochure, already signed by the NASA Administrator, is structured to show that the NASA and DoD have been studying the requirement for the ALS for some time and have a structured, joint program.

Your signing the attached brochure will help dispel critics of the NASA/DoD relationship and demonstrate that the two agencies are tackling this important program together. The brochure has been coordinated with the Air Force.


JAMES A. ABRAHAMSON
Lieutenant General, USAF
Director

Attachment



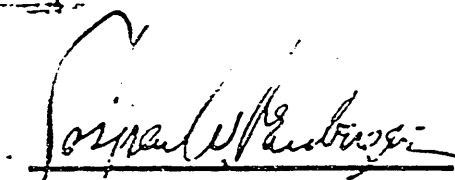
Space Transportation Technology

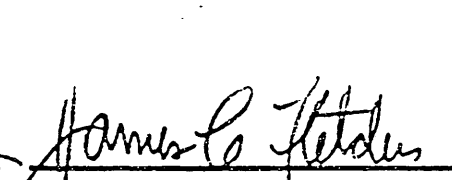
National Security Decision Directive (NSDD) "National Space Launch Strategy" signed by President Reagan on 25 February 1985, specified that:

DoD and NASA will jointly study the development of a second - generation space transportation system - - making use of manned and unmanned systems to meet the requirements of all users. A full range of options will be studied, including Shuttle-derived technologies and others.

A subsequent National Security Study Directive (NSSD) signed by the President in May 1985, presented directions for implementing the February 1985 NSDD. The study included a task to identify transportation technologies that are necessary and could be available for post - 1995 space transportation systems. This brochure outlines the technology investment plan developed jointly by DoD and NASA. It includes the key high leverage technologies required for moving to the next generation low cost space transportation systems and related operations.

Increasing international competition, the criticality of space transportation for future national activities like the Space Station and the Strategic Defense Initiative, and recent launch vehicle problems have served to emphasize the importance of reliable cost effective access to space.


Secretary of Defense
17 JUN 1987


NASA Administrator

Cost drivers for future space transportation architectures were developed based on anticipated technologies and past experiences (lessons learned). To reduce space vehicle and operations costs, new technologies must be matured to provide the following:

- Adequate vehicle margins
- Recovery of expensive hardware
- Automated preflight planning and flight operations
- Autonomous vehicle checkout and launch
- Increased reusability and reliability

Vehicle and operations technology advances applied to earth-to-orbit and orbit transfer vehicles will provide responsive and reliable cost effective access to space.

Integrated Technology Plan . . .

TECHNOLOGY ELEMENTS	ARCHITECTURE			
	Current Systems	Earth To Orbit		OTV
		Adv Hvy Lift	Second Gen Manneal	Adv Space Based
VEHICLE				
AEROTHERMODYNAMICS				
Computational Fluid Dynamics		✓	✓	♦
Aerothermodynamic Data Base		✓	✓	♦
Reentry		✓	✓	✓
Recovery		✓	✓	✓
Thrust Analysis Tools		✓	✓	✓
PROPULSION AND POWER				
LOX/Hydrocarbon Engine	✓	♦	♦	♦
LOX/Hydrogen Engine	✓	✓	✓	✓
Dual Fuel Engine	✓	✓	✓	✓
Adv LOX/Hydrogen OTV Engine	✓	✓	✓	✓
Fuel Cells	✓	✓	✓	✓
Cryo Fluid Management Experiments				♦
STRUCTURES AND MATERIALS				
Cryogenic Tanks	✓	✓	✓	♦
Passive Thermal Control	✓	✓	✓	♦
Deployable Aerobridges		♦	♦	♦
TPA Module Shell/Recovery		♦	♦	♦
High Temperature Structures	✓	♦	♦	♦
Light Weight/High Performance Materials	✓	♦	♦	♦
Aerospace Flight Experiments				♦
AVIONICS				
Advanced GN&C	✓	♦	♦	♦
Flight Management Systems	✓	♦	♦	♦
Automated Information Systems	✓	♦	♦	♦
GROUND AND FLIGHT OPNS				
AUTONOMOUS EXPERT SYS FOR:				
Mission Planning And Control	✓	✓	✓	✓
Checkout And Launch	✓	✓	✓	✓
Condition Monitoring/Serv/Maintenance	✓	✓	✓	✓
AUTOMATION AND ROBOTICS FOR:				
Ground Operations	✓	✓	✓	♦
Launch Fluid Management	✓	✓	✓	♦
Orbit Operations	✓	✓	✓	♦
AUTOMATED SOFTWARE				
OPERATION AND VERIFICATION	✓	✓	✓	✓

♦ PRIMARY
✓ BENEFIT

(4)

The United States Space Transportation Technology Program will develop the technologies necessary to move to the next generation space transportation system and maintain United States leadership in space. It includes previously planned technology investments by the National Aerospace Plane Program augmented, as shown in the previous TABLE, with necessary supplemental investments in aerothermodynamics, propulsion, power, structures and materials, avionics and automation and robotics.

Next Step

The next step in expanding to meet the space transportation needs of the 21st century is a Heavy-Lift Launch Vehicle, currently referred to as the Advanced Launch System (ALS). The goal of the ALS is to reduce significantly the cost of space transportation and to meet the increased emerging requirements of the DoD and NASA. Both the DoD and NASA FY 88 budget requests contain funds to accelerate technology efforts leading to the initial launch capability of the ALS.

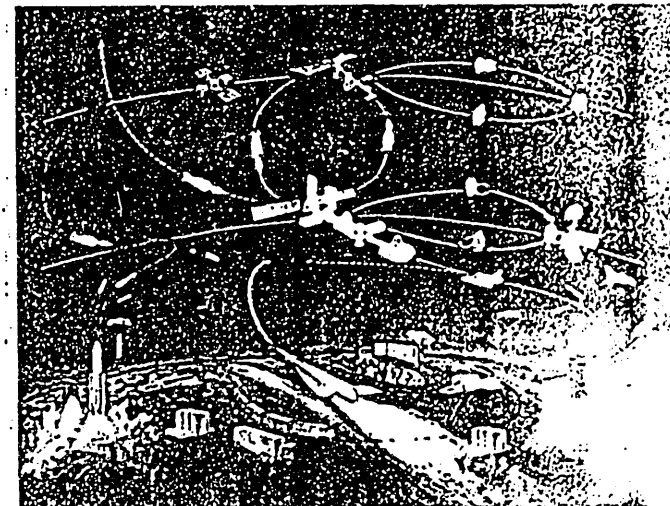
U.S. Space Launch Strategy

The U.S. national space launch capability will be based on a balanced mix of launchers, consisting of the Space Transportation System (STS), current expendable launch vehicles (ELV's) and a new fleet of advanced expendable, partially reusable and fully reusable vehicles. The elements of this mix will be defined to best support the mission needs of the national security, civil government and commercial sectors of U.S. space activities. Critical mission needs will be supported, whenever necessary, by several vehicle classes so as to provide added assurance that payloads can be launched regardless of specific vehicle availabilities.

President Reagan

(5)

The United States Space Transportation Technology Program



A Commitment To The Future



NASA
National Aeronautics and
Space Administration

Space Transportation Technology

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Robert M. Gates Secretary of Defense
James E. Hansen NASA Administrator

National Security Study Directive Guiding Principles

- Satisfy future national space transportation needs
- Substantially reduce the costs of space operations
- Develop a flexible and robust space transportation system
- Maintain world leadership in space transportation

Technology Task

Identify the technologies required for the development of the next generation low cost space transportation systems and related operations.

National Space Transportation Needs

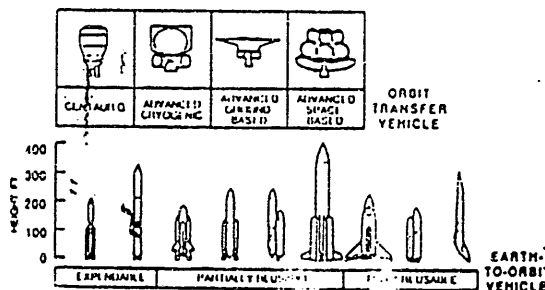
The space transportation needs for the next 25 years have been evaluated. A variety of potential mission scenarios were considered, ranging from constrained cases (the continuation of current national security and civil missions) to cases with substantial expansion (full deployment of the Strategic Defense Initiative (SDI) or an aggressive manned space exploration program as proposed by the President's National Commission on Space). National dependence on future space activities is expected to grow significantly over the next 25 years. Future space activities face an increasing need for robust, reliable, cost effective access to space along with the potential need for much greater launch capacity.

Mission Scenarios

	NASA SCENARIO	1. CONSTRAINED OPTION	2. NOMINAL GROWTH	3. LUNAR BASE INITIATIVE	4. PLANETARY AND HUMANS TO MARS INITIATIVE
DoD SCENARIO					
I CONSTRAINED SCENARIO					
II NOMINAL GROWTH SCENARIO					
III SDI KEY SCENARIO					
IV FULL SDI SCENARIO					

Current systems lack the low cost, operational versatility and capacity to meet these future needs. The most likely space transportation architectures to meet these needs are based on a mixed fleet of manned and unmanned launch vehicles and orbit transfer stages which utilize advanced vehicle and operations technologies. These architectures consisting of new partially reusable cargo launch vehicles, fully reusable manned vehicles, and reusable orbit transfer vehicles, would provide reliable cost effective space transportation for a wide variety of space missions well into the 21st century and would be capable of capacity expansion as necessary to meet the demands of aggressive civil or national security missions.

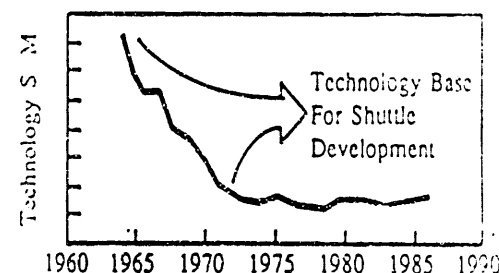
Representative Vehicle Concepts



The Problem

The U.S. space program began with the recognition that heavy research and technology investments had to be made to support a vigorous national commitment: early investments paid large dividends. But after peak investment in the early sixties, the space-related R & T Budget, including that which supported the Space Shuttle and current ELV launch systems, declined rapidly to a precariously low level in the mid-seventies. Since that time it has remained virtually constant, which has resulted in a steady erosion of our national expertise and a significant challenge to U.S. leadership at a time when our dependence on space activities is steadily increasing.

Space R & T Funding Trend



The Solution

The technology needs of our next generation space transportation systems are no less challenging than those faced by our past and present systems. We have amply demonstrated our ability to access, operate in and return from space. Today's fundamental challenge is to make those capabilities robust and affordable and to provide capacity growth to traffic demands. Now is the time to make a bold commitment to space transportation technology.

The simple fact is that the U.S. must continue space development. Space, despite its unique attributes, is just another medium which our nation transits and uses to meet national objectives - military and civil. The US must invest appropriately now and in the next few years in research and development to meet space transportation requirements of the future. The FY 88 President's Budget contains increases in future technology investments to ensure our ability to transport payloads to orbit at substantially reduced cost per pound. These increases are needed to assure access to space into the 21st century. We cannot afford to miss the window of opportunity to continue this nation's preeminence in space.